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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/763,099	01/21/2004	Charles Frank	119127-160997	7524
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Schwabe Williamson & Wyatt PACWEST CENTER, SUITE 1900 1211 SW FIFTH AVENUE PORTLAND, OR 97204			EXAMINER DILLON, SAMUEL A	
			ART UNIT 2185	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/763,099

**Applicant(s)**

FRANK ET AL.

**Examiner**

SAMUEL DILLON

**Art Unit**

2185

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 October 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 17-28, 30-41 and 43-46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-28, 30-41 and 43-46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-845)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB-08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### **I. ACKNOWLEDGEMENT OF INFORMATION DISCLOSURE STATEMENT**

1. The information disclosure statement (IDS) submitted on October 22, 2010 is in compliance with the provisions of 37 CFR 1.97. As required by M.P.E.P. ' 609 (C), the applicant's submission of the submitted IDS is acknowledged by the examiner and the cited references have been considered in the examination of the claims now pending. As required by M.P.E.P. ' 609 C(2), a copy of the PTOL-1449 initialed and dated by the examiner is attached to the instant office action.

### **II. RESPONSE TO AMENDMENT(S) / ARGUMENT(S)**

2. **Applicant's request for reconsideration (*interview summary mailed November 3, 2010*) of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.** The Examiner respectfully apologizes for any undue inconvenience.

3. Applicant's arguments (*response filed May 20, 2010*) with respect to the 35 U.S.C. 103(a) rejections of Claims 17-28, 30-41, 43 and 44 have been fully considered and are **persuasive**, but are moot in view of the new ground(s) of rejection, as described below.

4. Regarding all other Claims not specifically traversed above and whose rejections were upheld, the Applicant contends that the listed claims are allowable by virtue of their dependence on other allowable claims. As this dependence is the sole rationale put forth for the allowability of said dependent claims, the Applicant is directed to the Examiner's remarks above. Additionally, any other arguments the Applicant made that were not specifically addressed in this Office Action appeared to directly rely on an argument presented elsewhere in the Applicant's response that was traversed, rendered moot or found persuasive above.

### III. REJECTIONS BASED ON PRIOR ART

#### *Claim Rejections - 35 USC ' 103 – Wang and Lee*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 17-21, 23-28, 30, 31, 33-41, 43 and 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (*US Patent 6,834,326*) in view of Lee et al. ("*Petal: Distributed Virtual Disks*").

7. As per Claims 17, 28 and 36, but more specifically to Claim 17, Wang disclose(s) a method comprising:

establishing a plurality of characteristics (*configuration information, including LUN and ID information, RAID type, what multicast group they are in, what extent configurations are on the disk, stripe size, etc, col 11 Ins 51-61*) associated with an array group (*array of disks in a logical group, col 8 Ins 31-41*) that includes a plurality of array partitions (*contents of disks in the logical group, col 8 Ins 31-41*), the plurality of characteristics including a type of the array group, which indicates how data is distributed across the plurality of array partitions (*RAID type, col 11 Ins 51-61*), and establishing, on a storage medium, an array partition of the plurality of array partitions (*the NetSCSI autoconfiguration protocol is used to assign LUN and ID information to each disk, col 11 Ins 51-61*).

Wang discloses that it is possible to multicast the data to each disk and have the disks select which data they need (*col 12 Ins 3-9*). More specifically, Wang discloses

receiving, via a network interface (*connection between the RAID controller and each disk, fig 5*), a data access command multicast to the plurality of array partitions (*multicast the data to the disks, col 12 lns 3-9*), and

determining that the data access command pertains to the array partition based at least in part on the plurality of characteristics (*the disks know what LUNs they contain, and therefore what data would pertain to them, col 11 lns 51-61, col 12 lns 3-9*).

At the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify Wang to multicast the data to the disks and have the disks select which data they need. Wang discloses that there are positives (*col 12 lns 4-5*) and negatives (*col 12 lns 5-9*) with this approach, but the Examiner asserts that the motivation would have been that it would reduce the burden on the RAID controller (*col 12 lns 4-5*). Therefore, it would have been obvious to modify Wang to multicast data to each disk regardless of relevance for the benefit of reducing the burden on the RAID controller.

Wang discloses configuring the disks so that they "know" some of the relevant configuration information (*col 11 lns 51-61*). For the purposes of this rejection, Wang is not relied upon to disclose establishing a root partition containing the plurality of characteristics on the storage medium containing the array partition.

Lee discloses a distributed storage system where information that describes the members of the system is replicated across all peer servers in the storage system (*section 2 paragraph 3*). More specifically, Lee discloses establishing a root partition (*location of the information on the Petal server, section 2 par 3*) containing a plurality of characteristics (*information describing the current members of the storage system and the currently supported virtual disks, section 2 par 3*) on the storage medium containing an array partition (*disk storage, figure 2*) of a plurality of array partitions (*there are a plurality of disk storages, figure 2*).

Wang and Lee are analogous art in that they deal with networked storage devices. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify Wang to store the complete configuration information in each of the networked storage devices in place of using a RAID controller, using the teachings of Lee. The motivation for doing so would have been that it is better able to tolerate and recover from any single component failure (*Lee, section 1, list after paragraph 2*). Therefore, it would have been obvious to modify Wang per the teachings of Lee for the benefit of fault tolerance, to obtain the invention of Claims 17, 28 and 36.

8. As per Claims 18 and 37, but more specifically to Claim 18, Wang and Lee disclose(s) the storage appliance of claim 17, wherein the controller is further configured to receive, via the network interface, a plurality of partition commands from a host (*Lee, Petal RPC interface, section 3 paragraph 3*); and to establish the root partition and the array partition based at least in part on the plurality of partition commands (*Lee, section 3 paragraph 3*).

9. As per Claims 19, 30 and 38, but more specifically to Claim 19, Wang and Lee disclose(s) the storage appliance of claim 17, wherein the plurality of characteristics includes a multicast set associated with the array group (*Wang, what multicast group they are in, col 11 Ins 51-61*).

10. As per Claim 20, Wang and Lee disclose(s) the storage appliance of claim 19, wherein the controller is configured to receive a set command from a host via the network interface, and to establish the multicast set associated with the array group based at least in part on the set command (*Wang, col 11 Ins 51-61*). However, for the purposes of this rejection, Wang and Lee do not disclose the set command being multicast. Wang discloses using multicast packets when beneficial (*col 11 Ins 63-65*). It would have been obvious to modify Wang and Lee to multicast the configuration commands, per the teachings of Wang. The motivation would have been that

multicasting information can improve performance (*Wang, col 3 Ins 24-33*). Therefore, it would have been obvious to modify Wang and Lee per the further teachings of Wang for the benefit of performance, to obtain the invention of Claim 20.

11. As per Claims 21, 31, 39 and 43, but more specifically to Claim 21, Wang and Lee disclose(s) the storage appliance of claim 17, wherein the data access command is multicast to the plurality of array partitions using an Internet Protocol address (*Wang, column 8 lines 31-41*).
12. As per Claim 23, Wang and Lee disclose(s) the storage appliance of claim 17, wherein the plurality of characteristics includes the type of the array group and a description of the plurality of array partitions (*Wang, col 11 Ins 51-61*) and the controller is further configured to determine that the data access command pertains to the array partition based at least in part on the type of the array group and the description of the plurality of array partitions (*as combined above, Wang, col 12 Ins 3-9*).
13. As per Claims 24 and 34, but more specifically to Claim 24, Wang and Lee disclose(s) the storage appliance of claim 23, wherein the type is a stripe (*Wang, RAID 0, col 4 Ins 18-29*) and the plurality of characteristics further includes a length of the stripe (*Wang, col 11 Ins 51-61*).
14. As per Claims 25 and 35, but more specifically to Claim 25, Wang and Lee disclose(s) the storage appliance of claim 17, wherein the plurality of characteristics includes the parity rule of the array group (*Wang, RAID type includes what parity rule is in effect, col 4 Ins 18-29; RAID type is included in the configuration information, col 11 Ins 51-61*).
15. As per Claim 26, Wang and Lee disclose(s) the storage appliance of Claim 17, wherein the plurality of array partitions are associated with a plurality of logical block addresses (LBAs) (*Wang, col 20 Ins 31-42*) and the controller is further configured to calculate, based at least in part on the plurality of characteristics of the array group defined in the root partition, which LBAs

of the plurality of LBAs are associated with the array partition (*Wang, "what extent configurations are on the disk" is included in the configuration of the disk, col 11 lns 51-61; as combined above, Wang discloses that disks know what they contain based on the configuration, col 12 lns 3-9).*

16. As per Claim 27, Wang and Lee disclose(s) the storage appliance of claim 17, wherein the controller is configured to receive the data access command from a host and the controller is further configured to transmit, via the network interface, data directly to another array partition of the plurality of array partitions based at least in part on the data access command (*Lee, when a new server is added and the data is still being moved to balance the servers, commands can be forwarded directly between servers, pg 4 bottom of left column).*

17. As per Claim 33, Wang and Lee disclose(s) the method of claim 28, wherein the plurality of characteristics includes a description of the plurality of array partitions (*Wang, col 11 lns 51-61*) and said determining that the data access command pertains to the array partition is based at least in part on the type of the RA group and the description of the plurality of array partitions (*as combined above, Wang, col 12 lns 3-9).*

18. As per Claim 40, Wang disclose(s) an apparatus comprising:

a network interface (*connection of controller to the volumes, fig 5*); and

a controller (*RAID controller / switch, fig 5*) configured:

to store a plurality of characteristics of an array group which includes a plurality of array partitions (*configuration information, including LUN and ID information, RAID type, what multicast group they are in, what extent configurations are on the disk, stripe size, etc, col 11 lns 51-61*);



to establish an array partition of the plurality of array partitions on the storage medium (*the NetSCSI autoconfiguration protocol is used to assign LUN and ID information to each disk, col 11 lns 51-61*).

Wang discloses that it is possible to multicast data to each disk and have the disks select which data they need (*col 12 lns 3-9*). More specifically, Wang discloses a controller operative to multicast (*multicast the data to the disks, col 12 lns 3-9*), via the network interface, a packet to the plurality of array partitions, the packet having a data access command and a logical block address (LBA) to which the data access command pertains (*col 20 lns 31-42*), the LBA associated with only a subset of the plurality of array partitions (*the disks know what data they contain, and therefore what data would pertain to them, col 11 lns 51-61, col 12 lns 3-9*).

At the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify Wang to multicast the data to the disks and have the disks select which data they need. Wang discloses that there are positives (*col 12 lns 4-5*) and negatives (*col 12 lns 5-9*) with this approach, but the Examiner asserts that the motivation would have been that it would reduce the burden on the RAID controller (*col 12 lns 4-5*). Therefore, it would have been obvious to modify Wang to multicast data to each disk regardless of relevance for the benefit of reducing the burden on the RAID controller.

Wang discloses configuring the disks so that they "know" some of the relevant configuration information (*col 11 lns 51-61*). For the purposes of this rejection, Wang is not relied upon to disclose a controller to: transmit, via a network interface, a first partition command to establish a root partition on a storage medium; to transmit, via the network interface, a plurality of characteristics to be stored in the root partition; to transmit, via the network interface, a second partition command to establish the array partition.

Lee discloses a distributed storage system where information that describes the members of the system is replicated across all peer servers in the storage system (*section 2 paragraph 3*). More specifically, Lee discloses a controller to: transmit, via a network interface, a first partition command to establish a root partition (*location of the information on the Petal server, section 2 par 3*) on a storage medium (*Petal RPC is used to perform tasks such as adding a server, section 3 par 3*); to transmit, via the network interface, a plurality of characteristics to be stored in the root partition (*information describing the current members of the storage system and the currently supported virtual disks, section 2 par 3*); to transmit, via the network interface, a second partition command to establish the array partition (*occasionally a virtual disk's redundancy scheme over the set of servers over which it is mapped is changed, section 2.3*).

Wang and Lee are analogous art in that they deal with networked storage devices. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify Wang to store the complete configuration information in each of the networked storage devices in place of using a RAID controller, using the teachings of Lee. The motivation for doing so would have been that it is better able to tolerate and recover from any single component failure (*Lee, section 1, list after paragraph 2*). Therefore, it would have been obvious to modify Wang per the teachings of Lee for the benefit of fault tolerance, to obtain the invention of Claim 40.

19. As per Claim 41, Wang and Lee disclose(s) the apparatus of claim 40, wherein the controller is further configured to transmit a partition command to each of a plurality of storage appliances associated with a respective plurality of storage media to establish the plurality of array partitions (*Wang, each disk is configured, col 11 lns 51-61*).

20. As per Claim 44, Wang and Lee disclose(s) the method of claim 28, further comprising: receiving, via the network interface, one or more commands from a host; and providing the root partition and the array partition based at least in part on the received one or more commands (*Lee, user-level utilities operating on a remote machine; RPC is known in the art as "Remote Procedure Call", implying the user-level utilities are executed externally to Petal, section 3 par 3*).

21. As per Claim 45, Wang and Lee disclose(s) the storage appliance of claim 17, wherein the plurality of characteristics includes the type of the array group (*Wang, configuration includes RAID type, col 11 lns 51-61*), and the type comprises a RAID type 0, 1, 4, or 5 (*Wang, col 4 lns 18-29*).

22. As per Claim 46, Wang and Lee disclose(s) the storage appliance of claim 17, wherein the controller is further configured: to buffer data transmitted in the data access command (*Wang, col 7 lns 15-17*); to transfer, via the network interface based at least in part on the data access command, data from the array partition to a parity partition of the plurality of array partitions (*Wang, col 7 lns 11-17*); and to save the buffered data in the array partition (*Wang, col 7 lns 15-17*).

**Claim Rejections - 35 USC ' 103 – Wang, Lee and Vigue**

23. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

24. **Claims 22 and 32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (*US Patent 6,834,326*) and Lee et al. (*"Petal: Distributed Virtual Disks"*) as combined above with respect to Claim 28, in further view of Vigue et al. (*US Patent 6,983,326*).

25. As per **Claims 22 and 32**, Wang and Lee disclose(s) the storage appliance of claim 17, but for the purposes of this rejection does not disclose Claim 22.

Vigue discloses a controller configured to receive, via a network interface, a command (*receive "I Need" packer, fig 3*); to receive, via the network interface, a response to the command (*receive "I found" packet, fig 3*); and to disregard the command based at least in part on the response (*canceling request, fig 3*).

Wang as combined with Lee and Vigue are analogous art in that they deal with peer network devices. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to modify Wang and Lee to ignore a request if it has already been fulfilled, per the teachings of Vigue. The motivation would have been obvious to a person having ordinary skill in the art, and would have been that it would reduce network traffic. Therefore, it would have been obvious to modify Wang and Lee per the teachings of Vigue for the benefit of reduced network traffic, to obtain the invention of Claims 22 and 32.

26. The Examiner has pointed particular references contained in the prior art of record in the body of this action for the convenience of the Applicant. Although the specified citations are representative of the teachings in the art and are applied to the specific limitations within the

individual claim, other passages and figures may apply. The Applicant, in preparing the response, should consider fully the entire reference as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

#### **IV. CLOSING COMMENTS**

##### **a. STATUS OF CLAIMS IN THE APPLICATION**

27. The following is a summary of the treatment and status of all claims in the application as recommended by M.P.E.P. ' 707.07(i):

##### **a(2). CLAIMS NO LONGER IN THE APPLICATION**

28. Claims 1-16, 29 and 42 were cancelled by amendment.

##### **a(4). CLAIMS REJECTED IN THE APPLICATION**

29. Per the instant office action, Claims 17-28, 30-41 and 43-46 have received an action on the merits and are subject of a non-final action.

##### **b. DIRECTION OF FUTURE CORRESPONDENCES**

30. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Dillon whose telephone number is 571- 272-8010. The examiner can normally be reached on 9:30-6:00.

31. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sanjiv Shah can be reached on 571-272-4098. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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**IMPORTANT NOTE**

32. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sanjiv Shah/  
Supervisory Patent Examiner, Art Unit 2185

Sam Dillon  
Examiner  
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